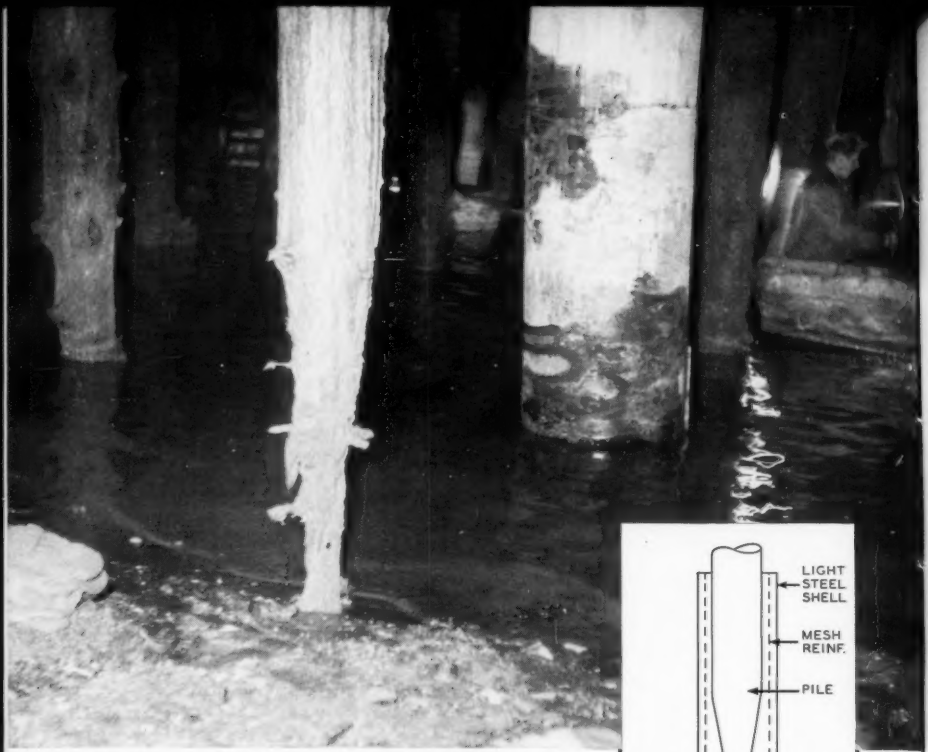
ACI News Letter

Vol. 22 No. 10 JOURNAL of the AMERICAN CONCRETE INSTITUTE June 1951



View under wharf showing salt water erosion of wooden piles, and Prepakt-encased pile which provides even greater-than-original load-bearing and bending strength. Detail section of pile repair is shown in the sketch at right.

USE PREPAKT FOR LOWER COST PILE RESTORATION!

Prepakt methods and materials are proving highly successful in repairing rotted and worn wooden piles—without taking the structure out of service for pulling old piles and driving new ones.

Prepakt methods permit the encasement of the old piles—both above and below the waterline—with a high-strength, impermeable casing of concrete. Prepakt materials provide this casing with extreme durability in either fresh or salt water, and high resistance to freezing and thawing.

Full information, on this and other Prepakt advantages, may be had by writing or calling the Main Office, Cleveland, Ohio.

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ACI News Letter Contents

June 1951

On the Cover—Lifting prestressed girders into place on the Arroyo Seco pedestrian bridge. See "Are Prestressed Bridges Cheaper?" p. 761, for a detailed description of problems met by the California Division of Highways in building a prestressed bridge

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Tentative program for national prestress conference

The first United States conference on prestressed concrete, at the Massachusetts Institute of Technology, Cambridge, August 14-16, will feature sessions on application, materials, design and research, with emphasis on the use of prestressing in this country.

The 3-day conference is being sponsored by the M. I. T. Departments of Architecture, Building Engineering and Construction, and Civil and Sanitary Engineering in conjunction with ACI, AGC, AIA, ASCE, AREA and PCA.

Tuesday, August 14

Morning

Registration

Welcoming address—John B. Wilbur, Head, Dept. of Civil and Sanitary Engineering, M. I. T., Cambridge

Applications

Why Prestressed Concrete?—L. H. Corning, Manager, Structural and Railways Bureau, PCA, Chicago

Discussion—F. S. Merritt, Associate Editor, *Engineering News-Record*, New York

Tanks—Curzon Dobell, Vice-President, Preload Enterprises, Inc., New York

Pipes—J. G. Hendrickson, American Concrete Pipe Assn., Chicago

Discussion—H. F. Kennison, Chief Engineer, Lock Joint Pipe Co., East Orange, N. J.

Afternoon

Bridges (Survey of European experience)—C. C. Zollman, Chief Design Engineer, Prestressed Concrete Corp., Kansas City

Bridges (Survey of United States experience)

S. S. Baxter, Acting Chief Engineer, Bureau of Engineering Surveys and Zoning, Dept. of Public Works, Philadelphia

R. H. Bryan, Bryan and Dozier, Consulting Engineers, Nashville

C. L. Johnson, Clark, Johnson and Anderson, Consulting Engineers, Pontiac, Mich.

K. H. Middendorf, Vice-President and Chief Engineer, Prestressed Concrete Corp., Kansas City

F. W. Panhorst, Bridge Engineer, State Division of Highways, Calif.

Evening

Buildings—J. K. Gannett, Vice-President and Director of Engineering and Research, Austin Co., Cleveland

Discussion—P. Belluschi, Dean of Architecture and City Planning, M. I. T., Cambridge

Pavements

L. Coff, Consulting Engineer, New York

B. F. Friberg, Vice-President, Granco Steel Products Co., Granite City, Ill.

Continued on p. 4

Wednesday, August 15
Morning

Piles—A. E. Cummings, Director of Research, Raymond Concrete Pile Co., New York

Mass-Produced Units—K. P. Billner, Vacuum Concrete Corp., Philadelphia

Afternoon

Materials

Concrete—H. L. Kennedy, Manager, Cement Division, Dewey and Almy Chemical Co., Cambridge, Mass.

Discussion—R. F. Blanks, Chief, U. S. Bureau of Reclamation, Denver

Wire—H. J. Godfrey, Assistant Chief Development Engineer, John A. Roebling's Sons Co., Trenton, N. J.

Discussion—W. J. Eney, Head, Dept. of Civil Engineering, Lehigh University, Bethlehem, Pa.

Bars—Donovan Lee, Consulting Engineer, London, England

Thursday, August 16
Morning

Design and Research

Design (General considerations) — M. Fornerod, Chief Engineer, Preload Enterprises, Inc., New York

Design—(Basic concepts)—T. Germundsson, Structural and Railways Bureau, PCA, Chicago

Discussion—Dean Peabody, Jr., Harvard University, Cambridge, Mass.

Design (Continuous spans)—G. H. Paris and A. L. Parme, PCA, Chicago

Afternoon

Research (General discussion)—C. P. Siess, Dept. of Civil Engineering, University of Illinois, Urbana

Reports on Specific Research Projects—

A. R. Anderson, Consulting Engineer, Springdale, Conn.

B. J. Baskin, Chief Engineer, Concrete Products Co. of America, Philadelphia

B. Birdsall, Assistant Chief Engineer, Bridge Department, John A. Roebling's Sons Co., Trenton, N. J.

R. B. Crepps, Director, Testing Division, Owens-Corning Fiberglass Corp., Newark, Ohio

H. J. Hansen, Head, Structures Research Dept., U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif.

J. R. Janney, Assistant Development Engineer, Structural Development Section, PCA, Chicago

R. L. Reid, Consulting Engineer, Houston, Texas

W. C. Voss, Head, Dept. of Building Engineering and Construction, M. I. T., Cambridge

The tentative program includes only those participants confirmed prior to May 18, 1951.

Prestressed Concrete Conference
Room 1-163
Massachusetts Institute of Technology
Cambridge 39, Mass.

ACI

Gentlemen:

I am interested in attending the First U. S. Conference on Prestressed Concrete. Please send me information on registration fees, housing, etc.

Name.....

Address.....

.....

Affiliation.....

Roy W. Crum

Roy W. Crum, director of the Highway Research Board of the National Research Council since 1928 and ACI past president died recently. He was one of the pioneers in road materials research.

A graduate of Iowa State College, he taught and worked at the Iowa Experiment Station until 1919. During this time he conducted research on materials for "new" concrete roads. His mix designs using screened and unscreened gravel of Iowa deposits were a major contribution to the economic feasibility of improving the highways of that region.

In 1919 he became engineer of materials and tests for the Iowa State Highway Commission, and his efforts made this department one of the outstanding of its kind in the country. Cooperating with fellow officials in other states, he led in the development of standard methods for tests of highway materials.

Continued on p. 18

DAREX AEA

AIR ENTRAINING AGENT FOR CONCRETE

TRUE ECONOMY AT McNARY

In the construction of the big McNary Dam on the Columbia River, DAREX AEA is now being used as the most economical air entraining agent to improve plasticity of the concrete as well as to reduce bleeding and segregation . . . another piece of evidence that no other air entraining agent for concrete is more efficient than DAREX AEA . . . that no other costs so little per cubic yard of quality concrete.

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DEWEY & ALMY Chemical Company

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Postage-stamp size gage measures stresses and strains

Measurement of stresses and strains in concrete structural members by bonded resistance wire strain gages is proving to be practicable and valuable, recent experimental work and successful practical applications show. These include tests on a prestressed girder for the Walnut Lane bridge, on concrete structural parts stressed by a new 1,000,000-lb testing machine in the Portland Cement Assn. laboratory, and on concrete structural members stressed by a new 5,000,000-lb testing machine in the Bureau of Reclamation laboratory.

Although postage-stamp size SR-4 strain gages have been utilized for several years in stress analysis of metals, and as sensing elements in various load measuring and process control devices, it was necessary to solve more difficult problems before they could be used successfully on concrete. The characteristics of the gage and of concrete indicate the sources of difficulties.

Essentially, an SR-4 strain gage is a grid of very fine wire bonded to a paper base or embedded between two plastic films. To measure strains, the gage is cemented firmly to the surface of the member under test. An electric current is passed through the wire grid. As it undergoes dimensional changes with the test piece, its electrical resistance varies in fixed relation with the strains. These resistance changes are measured with a Wheatstone bridge circuit or potentiometer, a specially designed electronic strain indicator, or with an oscillograph.

The principal problems to be solved before the gages could be used on concrete were (1) production of satisfactory bond, (2) prevention of moisture in concrete from affecting leakage resistance between gages and ground, (3) shrinkage and creep of concrete, (4) lack of homogeneity of concrete, and (5) the scanty information concerning stress-strain relationships for the many grades of concrete used in construction.

Attaching SR-4 gages

A procedure has been recommended by Arthur R. Anderson, consulting engineer, Springdale, Conn., for producing a firm and dependable bond.

First, the surface area within which the strain gage is to be placed is ground to a smooth plane. All dust is removed and the concrete dried thoroughly. The base for the gage is then prepared by applying a heavy coat of household Duco cement to the concrete surface and to a piece of 0.010-in. thick celluloid. The latter is firmly pressed against the treated surface of the concrete. The film of celluloid serves as a shield and forces the cement into the pores of the concrete.

After drying for 24 hours the film is sandpapered smooth. Finally an SR-4 gage is applied in the usual manner* with nitrocellulose cement. Fig. 1 shows an A-3 type

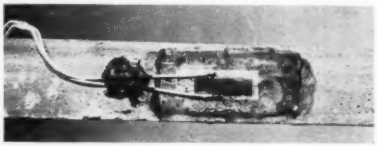


Fig. 1—SR-4 type A-3 gage bonded to concrete. A celluloid film base on the concrete under the gage provides a moisture barrier and a means of bonding the gage to the concrete.

gage cemented to concrete by this procedure. Wires leading to the gage are attached to the concrete by a patch of Miracle adhesive (Miracle Adhesive Corp., New York). This will support their weight and protect the delicate wires in the gage.

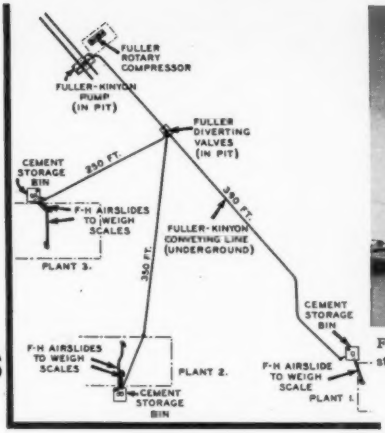
To protect the gage from moisture, a liberal coat of hot Petrosene wax (General Petroleum Co. product obtainable in small quantities from SR-4 gage manufacturers, Baldwin-Lima-Hamilton Corp.) is applied over the gage. The further precaution of lacquering a fairly large area of concrete surface around the gage prevents moisture absorption around and under the gage. Fig. 2 shows gages applied with the concrete lacquered around the gage area.

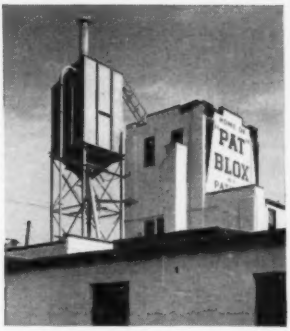
Walnut Lane bridge test

This procedure has been used in several large-scale experiments, the most notable the testing of a 160-ft prestressed concrete test girder for the Walnut Lane bridge.

*Bulletin No. 279-B, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

SURVEY AND STUDY BRING RESULTS





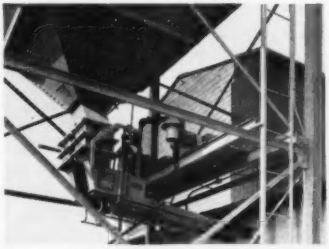
Fuller Kinyon Conveying line entering storage bin. Airslide under bin.

in Paturzo's Concrete-Block Plant

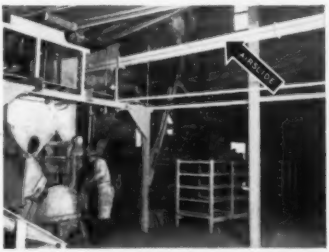
When the engineers of V. Paturzo, Bro. & Son, Inc., Baltimore, Md., needed conveying equipment for their modern concrete-block plant, they turned to Fuller for suggestions and aid in selecting the most efficient method for handling Portland cement. As a result, Paturzo has standardized on Fuller equipment wherever possible.

Cement is conveyed from hopper-bottom cars by a Fuller-Kinyon Pump to three storage bins. This pump has a capacity of 200 barrels an hour. And they didn't stop there . . . they installed F-H Airslides under all bins, for conveying to weigh scales over the mixers. These Airslides, equipped with F-H Airfeeders and F-H air motor-operated cut-off gates, above the scales, give them perfect control of each batch, in addition to clean operation and minimum power consumption.

Why not have a Fuller engineer make a survey of your conveying system and submit his recommendations, based upon your particular requirements? No obligation, of course.



Two Airslides and Airfeeders conveying from storage bin to weigh scales in plant.



Airslide delivering to weigh scale over mixer in plant.

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DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS, AND ASSOCIATED EQUIPMENT

Fuller G-66

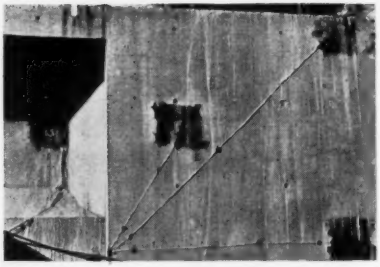

Fig. 2—SR-4 strain gages attached to the Walnut Lane bridge test girder. The area around each gage is lacquered to make the concrete resistant to moisture.

Twenty-three gages were installed on the surface of the concrete and were connected by several thousand feet of wiring to a strain indicator.

Strains in the concrete girder were measured during the tensioning of 256 prestressing wires and during the subsequent girder loading tests up to and including destruction of the girder.

The modulus of elasticity of the concrete was determined from measurements of the fundamental frequency of vibration of the girder. This was accomplished by connecting an oscillograph to strain gages on the girder and recording the vibration of the girder produced by men jumping on it. It was possible for a few men to oscillate the span through a deflection of more than 1 in. at its natural frequency of just over two cycles per second. The elastic modulus of the concrete was calculated from the vibration frequency as recorded by the strain gages and oscillograph.

Fig. 3—Strain gage units for measuring strains in a prestressed concrete girder were made by bonding four SR-4 resistance wire strain gages to curved metallic elements which were bolted together. The four gages are wired together to form a complete Wheatstone bridge circuit with high sensitivity and temperature compensation. These units were encased in small, waterproof briquettes of mortar and calibrated before being embedded in the girder.

Wires in the Walnut Lane girder were stressed after the concrete had matured to an established compression strength. Consequently the gages could be applied to the surface of the concrete prior to the stressing operation.

Pre-tensioned girder tests

A different set of conditions was encountered in strain measurements in a prestressed concrete girder for the Concrete Products Corp. of America at its Pottstown, Pa., plant. Here the reinforcing wires were tensioned before placing the concrete.

In these tests, tension was maintained in the wires by means of jacks during the curing period of the concrete. After the concrete reached design strength the jacks were released, transferring the load to the concrete. Anchorage was thus achieved through a bond between wires and concrete. To measure the stress in the concrete when the wires were released, specially designed gage units (Fig. 3) were placed in the concrete at the time of placing.

Four SR-4 gages were used in each unit. Arranged to form a complete strain gage bridge circuit, they had the advantage of higher sensitivity, and of providing temperature compensation within the unit. Before being embedded in concrete, each unit was encased in a small briquette of mortar and calibrated. Fig. 4 shows four of the strain gage units placed in a test girder form ready for the concrete to be placed around them. The units, being completely waterproof, were unaffected by the wet concrete, and they performed well during the stressing operation and subsequent load tests.

After release of tension in the wires, the girder was removed from the forms and set up for load tests (Fig. 5). Additional SR-4 strain gages were installed on the surface of the girder. Three test cylinders were cast to obtain stress-strain data; strain data were obtained from strain gages attached on opposite sides of each test cylinder.

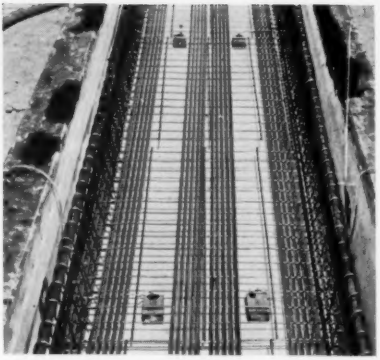

Fig. 4—Internal strains were measured in a reinforced and prestressed concrete girder, by placing four resistance wire strain gage units, encased in waterproof concrete briquettes, in the form. Cables were tensioned before concrete placement and were released after the concrete had reached design strength.

As had been done for the Walnut Lane bridge test, oscillograph data from strain gages were recorded during vibration of the girder. The elastic modulus of concrete as determined from cylinder tests, from girder vibration data, and from load-deflection data for the girder gave values that agreed within a few percent.

Fig. 5—In load tests of the 30 ft prestressed concrete girder by Concrete Products Corp. of America, a load of 75,000 lb produced a deflection of 7 in. Loading was continued to destruction. Electrical connections between SR-4 resistance wire strain gages in the girder and indicator are shown at left.

Just a reminder—

No Journal issues in July and August

For Concrete Construction....

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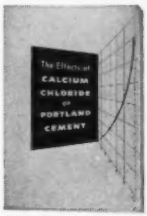
Here's the story of what Calcium Chloride will do for concrete construction—and its effect on Portland Cement. You can step up schedules and reduce costs . . . lengthen the pouring day . . . cut costly protection time in half . . . reduce or eliminate overtime finishing with the addition of Solvay Calcium Chloride to your concrete mix. For details, send for "The Effects of Calcium Chloride on Portland Cement," a 40-page semi-technical book—the result of research conducted by nationally recognized authorities, giving details of carefully controlled tests made in the field and in the laboratory.



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JC-6

Who's Who This Month

Stewart Mitchell

Stewart Mitchell, principal bridge engineer —planning, California Division of Highways, Sacramento, discusses the question, "Are Prestressed Bridges Cheaper?" on p. 761.

A graduate of Purdue University, he served with the Oregon State Highway Commission, 1919-24, chiefly as resident engineer. He has been with the California Division of Highways since 1924, starting as resident engineer on a reinforced concrete arch bridge. He has had general charge of bridge construction and maintenance and in his present capacity is in general charge of preliminary studies, designs and specifications.

Mr. Mitchell is a member of the executive committee of the Structural Division of ASCE and the committee on ultimate design of reinforced concrete. He is also a member of the Structural Engineers Assn. of Central California.

F. H. Jackson and I. L. Tyler

F. H. Jackson, principal engineer of tests, Bureau of Public Roads, Washington, D. C., and I. L. Tyler, manager, Field Research Section, Portland Cement Assn., Chicago, collaborated on "Chapter 7. New York Test Road" of the "Long-Time Study of Cement Performance in Concrete," p. 773.

Past president of ACI, Mr. Jackson is well known to JOURNAL readers and has been active in Institute affairs since 1924. He was awarded, with Harold Allen, the Wason Medal for the most meritorious paper in 1948 for "Concrete Pavements on the German Autobahnen." Associated with the Bureau of Public Roads since 1905, he has received recognition from several organizations for his work in the highway field, including the Distinguished Service Award of the Highway Research Board in 1948; the Meritorious Service Award of the U. S. Department of Commerce in 1950, and was elected to Honorary Membership in ASTM in 1948.

Mr. Tyler has been in charge of all construction work and field inspection for the Long-Time Study. Prior to joining PCA he worked on hydroelectric construction and as materials engineer on various projects, including the Big Creek project of Southern California Edison Co., office engineer with Phoenix Utility Co. on construction of Ariel Dam in Washington and concrete technologist at Morris Dam in California. From 1934-39 he was materials engineer with the Tennessee Valley Authority in charge of inspection, concrete laboratories and technical phases of concrete construction on Norris, Chickamauga and Hiwassee dams. Following work as concrete and materials engineer for the Pennsylvania Turnpike Commission, he joined PCA in 1941 and was appointed to his present position in 1945.

F. N. Hveem

"Slab Warping Affects Pavement Joint Performance," p. 797, introduces F. N. Hveem, materials and research engineer, California Division of Highways, Sacramento.

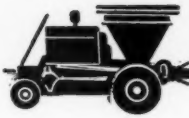
He joined the Division of Highways in 1917, serving successively as draftsman, timekeeper and assistant resident engineer on all types of highway construction up to 1925. He was maintenance superintendent, 1925-27, and resident engineer, 1927-29. From 1930-50 Mr. Hveem served as assistant materials and research engineer, primarily concentrating upon bituminous types of pavement and soils and foundation materials.

In 1944 he was assigned to an extensive investigation of portland cement concrete pavements in California to determine causes for distress and failure at joints in the pavement slabs. He was appointed construction engineer in 1950 and to his present position as materials and research engineer this month.

J. L. Gilliland

"Identification of Dehydrated Gypsum in Portland Cement," p. 809, by J. L. Gilliland, head, Chemical and Cement Laboratory, Bureau of Reclamation, Denver, is the second article pertaining to false set in portland cement to appear in recent JOURNAL pages. Mr. Gilliland was co-author with

Continued on p. 20



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The Low-Cost Method of Placing Quality Concrete!

Rex Pumpcrete offers the lowest cost method of placing concrete of improved quality. The "concrete by pipe line method," properly employed, will assure the best job structurally at far lower cost as compared to other placement methods.

Segregation of the mix is completely eliminated by the conditioning hopper and direct pumping into the forms. Discharge into the forms is more readily controlled. Proof of Pumpcrete's quality placement is evidenced by the fact that, where quality is paramount, leading engineering organizations specify Pumpcrete.

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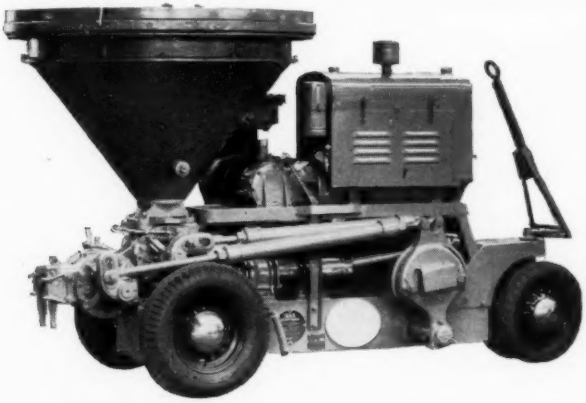
It may be that your next job should be a Pumpcrete job. Why not consult your Rex Distributor and get the full story of what Pumpcrete . . . *the pump that pumps concrete through a pipe line* . . . can do for you. Or if you prefer, write directly to Chain Belt Company, 1713 West Bruce Street, Milwaukee 4, Wisconsin.



. . . CHAIN BELT COMPANY REX CONSTRUCTION MACHINERY

Honor Roll

February 1—April 30, 1951

Morgan holds top spot

Newlin D. Morgan, Sr., still leads this month with 28 members proposed. Eddy Hernandez and J. E. Jellick are tied for second place with H. J. Gilkey running a close third. Let's make it a higher percentage of the membership taking places on this year's honor roll.

Newlin D. Morgan, Sr. (Ill.)	28
Eddy Hernandez (La.)	6½
J. E. Jellick (Calif.)	6½
H. J. Gilkey (Ia.)	6
L. G. Farrant (Fla.)	5
Oscar A. Nunez G. (Venezuela)	5
Fernan Rodriguez-Gil (Venezuela)	3
Samuel Hobbs (Calif.)	2½
Frank Kerekes (Ia.)	2½
Rafael Ruiz (Guatemala)	2½
George D. Youngclaus (Calif.)	2½
Robert G. Deitrich (Md.)	2
Oliver J. Julian (Mass.)	2
James A. McCarthy (Ind.)	2
Howard Simpson (Mass.)	2
Jose A. Vila (Cuba)	2

New Members

Membership total—5281

ACI adds still another to the vast number of countries shown on membership records—a new member this month from Bolivia.

36 Inaividual, 2 Corporation, 6 Junior, 10 Student Members bring membership total to 5281 on May 1.

Individual

BACARREZA-RONCAL, HUGO, La Paz, Bolivia (City Engr., Dept. of Agriculture, La Paz)
BOYAR, JULIUS W., Elkins Park, Pa. (Struct. Designer, Catalytic Constr. Co.)
CAMPBELL, LINDEN CARLYLE, Spokane, Wash. (Cons. Engr.)
CARBONELL, CELSO A., Panama, Panama (C. E., Minister of Public Works)
DAVIS, HAROLD S., Pullman, Wash. (Asst. Prof. of C. E., State College of Wash.)
DELAMATER, R. S., Wichita, Kans. (Cons. Engr.)
DELAPPE, RUSSELL GUERNE, Berkeley, Calif. (Arch.)
DUNASKY, H. J., Milwaukee, Wis. (Field Engr., Master Builders Co.)
FREEDMAN, BARNETT D., Miami, Fla. (Professional Engr.)
GIBSON, JAMES T., Americus, Ga. (Supt., W. K. Upchurch Constr. Co.)
GORDON, JOHN SHELTON, Pasadena, Calif. (General Bldg. Contr.)
GRAY, JAMES C., Houston, Texas (Research Chem., Trinity Portland Cement Div., General Portland Cement Co.)
HARRY, WALTER CHARLES, Miami, Fla. (Struct. Designer, L. G. Farrant)
HINDS, JULIAN, Los Angeles, Calif. (Genl. Mgr. & Chf. Engr., Metropolitan Water District of S. Calif.)
KANAREK, NAT T., Jackson Heights, N. Y. (Struct. Engr., J. S. Aronow)
KOFODIMOS, THOMAS JOHN, Chicago, Ill. (Struct. Engr., Sinclair Refining Co.)
LEVY, ISRAEL, Tel-Aviv, Israel (Struct. Engr.)
LIEBERMAN, MORTON W., Princeton, N. J. (Cons. Engr.)
LOWRY, R. W., Dillsburg, Pa. (Vice-Pres., Capital Engrg. Corp.)
MA, S. F. JAMES, Hamilton, Ont., Canada (Designing, Drafting, D. N. McIntosh)
MEYER, J. G., Stockton, Calif. (Calif. Dept. of Public Works, Highway Dept.)
MOORE, STEWART R., Richmond, Va. (Struct. Engr., Commonwealth of Virginia)
NUDD, DEREK GILBERT, Trinidad, B. W. I. (Head of Struct. Engrg., W. H. Watkins & Partners)
NUSSER, RALPH W., Kansas City, Mo. (Sales Engr., Sheffield Steel Corp.)
PAN, SAI-LUNG, New York, N. Y. (Jr. Engr., Ammann & Whitney)
PERAINO, JOSEPH, New York, N. Y. (Charge of Design and Engrg., Merritt-Chapman & Scott Corp.)
POST, ROSWELL D., Birmingham, Ala. (Pres., I. E. Morris Cons. Engr., Inc.)
REIDY, PETER J., New York, N. Y. (Pres., Purdy & Henderson Assoc., Inc.)
SAMPEY, MILLS, Cleveland, Ohio (Chf. Draftsman, Loftus Engr. Corp.)
SELZER, LEON, New York, N. Y. (Struct. Designer, Weinberger & Weishoff)
STOKER, RUSSELL D., Riverton, Wyo. (City Engr., City of Riverton)
VOLLAND, R. E., Birmingham, Ala. (Asst. Mgr., Virginia Steel Co.)
WARNER, H. R., Kalamazoo, Mich. (Plant Supt., Kalamazoo Concrete Pipe Co.)
WHITNEY, ROGER H., Newington, Conn. (Insp. and Draftsman, Bureau of Public Works)
WYSE, J. W., Toronto, Ont., Canada (Pres., Armoured Floor Co., Ltd.)

Corporation

CENTRAL SUPPLY CO., Watsonville, Calif. (Bruce G. Woolpert, Engr.)
FLUOR CORP., LTD., Los Angeles, Calif. (R. L. Merrick, Mgr. of Engrg.)

Junior

AMORY, WALTER, Wellesley Hills, Mass. (Struct. Designer, Jackson & Moreland)
FRYD, ITSHAQ, Miami Beach, Fla.
GUZMAN HERRERA, ROBERTO ELIAS, Caracas, Venezuela (Engr. of Service, Minister of Public Works)
KIRKAGACLIOGLU, ALI A., Stillwater, Okla. (Grad. Student)
NIELSEN, E. F., Oakland, Calif. (Struct. Design Engr., Kaiser Engineers, Inc.)
WRIGHT, JOHN W., Toronto, Ont., Canada (Struct. Engr., Canadian Breweries, Ltd.)

Student

BERNASCONI, LOUIS H., Chicago, Ill. (Ill. Inst. of Tech.)
CLAWSON, GORDON LAW, JR., Pittsburgh, Pa. (Carnegie Inst. of Tech.)
COUTRIS, ACHILLES W., New Haven, Conn. (Yale Univ.)
CRUZ BAJARES, EDUARDO, Caracas, Venezuela
ETTER, CHARLES GAINES, JR., Cambridge, Mass. (Mass. Inst. of Tech.)
LUDLUM, CHARLES H., Rensselaer, N. Y. (Rensselaer Poly. Inst.)
ROLIN, ETIENNE DANIEL, Belgium (Univ. of Calif.)
SASTRE FRAN, MICHEL A. Utuado, P. R.
SIMON FELICO, PABLO, Havana, Cuba
SWORD, E. C., State College, Pa. (Pa. State College)

This New-Billet Bar Now Designated by Simplified Numbering System

The Bethlehem Reinforcing Bar is now designated by numbers from 2 to 11, in accordance with Simplified Practice Recommendation R26-50 of the U. S. Dept. of Commerce. Each of these numbers represents approximately the eighths-of-an-inch in the nominal diameter of the bar. Bars #9, #10, and #11 are equal in weight and nominal area to the old type 1 in., 1⅛ in., and 1¼ in. square bars. The bar numbers—except in the case of the #2 plain round bar—are branded at regular intervals on each deformed bar to facilitate identification.

The various sizes of the Bethlehem Bar are rolled as round sections. No change has been made in either the standard unit weights or nominal cross-sectional areas. Therefore there is no need for you to alter basic design practices as they concern bar section.

The Bethlehem Bar is a high-quality bar because it is made from new-billet steel which meets ASTM Specification A15. The bar provides a firm, adequate bond in concrete because its high, uniformly-spaced lugs meet the deformation requirements of ASTM Specification A305.

The accompanying table shows the new numbers for the Bethlehem Reinforcing Bar, as well as the old size designations, nominal areas, and nominal diameters. Use these new numbers on your next bar order.

BETHLEHEM REINFORCING BARS

New Bar No.	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Old Size	¼ in. Round	⅜ in. Round	½ in. Round	⅝ in. Round	¾ in. Round	⅞ in. Round	1 in. Round	1 in. sq. equiv.	1⅛ in. sq. equiv.	1¼ in. sq. equiv.
Nominal Area (sq in.)	.05	.11	.20	.31	.44	.60	.79	1.00	1.27	1.56
Nominal Diam.	.250	.375	.500	.625	.750	.875	1.00	1.128	1.270	1.410

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM

REINFORCING BARS

The size of each Bethlehem Bar is easily determined by means of a number rolled into the bar.

Positions and Projects — ACI Members

Stanton retires

T. E. Stanton, formerly materials and research engineer, California Division of Highways, retired this month. He was succeeded by F. N. Hveem, formerly construction engineer in the Highway Division.

Well-known in the highway and concrete fields, Mr. Stanton has been active in ACI since 1929 and received with Lester C. Meder the Wason Medal for noteworthy research reported in their 1938 paper, "Resistance of Cement to Attack by Sea Water and by Alkali Soils."

Since 1912, he had been continuously with the California Division of Highways, serving successively as assistant division engineer, assistant highway engineer, and was in charge of materials and research since 1928.

Goldbeck honored by HRB

The Highway Research Board of the National Research Council paid special tribute to A. T. Goldbeck, engineering director, National Crushed Stone Assn., by presenting him with the HRB Distinguished Service Award "in recognition of outstanding achievement in the field of highway research."

An ACI vice-president, Mr. Goldbeck has been active in ACI since 1926 on the Board of Direction, administrative committees and technical committees.

Following graduation from the University of Pennsylvania, he served as an instructor at his alma mater and at Lafayette College. He joined the Office of Public Roads in 1910, became assistant engineer in charge of the Philadelphia Municipal Laboratory in 1913 and rejoined the reorganized Bureau of Public Roads and Rural Engineering in 1915. He served the Bureau successively as engineer of tests and chief of the Division of Tests. In these capacities he conducted and directed research on concrete pavement design and developed the Goldbeck soil pressure cell.

Since 1925, he has been engineering director with the National Crushed Stone Assn.

Parsons and Clemmer to represent ACI

Douglas E. Parsons, chief, Building Technology Division, National Bureau of Standards, Washington, D. C., and H. F. Clemmer, engineer of materials, Government of the District of Columbia, recently were named ACI representatives to the Building Research Congress to be held in London, England, September 11-20.

The conference will include sessions on the engineering and structural aspects of building, building materials, and factors affecting the comfort and efficiency of people using the buildings.

Harry F. Thomson (right) is presented a section of an A305 bar by A. C. Weber, director of research, Laclede Steel Co., St. Louis, at the Rail Steel Bar Assn. annual meeting.

Thomson speaks at annual meeting

ACI President Harry F. Thomson, manager, Redi-Mixed Concrete Division, Material Service Corp., Chicago, was the guest speaker at the annual meeting of the Rail Steel Bar Assn. in Chicago last month. His topic was "Cooperation between Concrete and Steel." He emphasized the need for cooperation between organizations of steel men and concrete men in advancing their mutual interests for improved building materials and techniques. He cited as an example the cooperation and investigations in the development of new bond values for improved reinforcing bars. These provisions were incorporated in the revised Building Code adopted at ACI's San Francisco convention.

Eldridge re-opens office

R. V. F. Eldridge, consulting engineer, Melbourne, Australia, has reentered private

Continued on p. 16

The good performance of Masterbuilt iron armored concrete floors in two other Hinde & Dauch plants resulted in the company's decision to install this modern industrial floor in the fine new plant shown above, located in Richmond, Va.

Many million square feet of Master Builders Masterplate Floors are in use in leading industries and giving excellent service. Their iron-concrete surface gives them four to six times greater wear resistance than plain concrete floors and makes them spark-safe, non-dusting, non-slip and easy to clean. Whether non-colored or produced in one of the eleven attractive colors, Masterplate Floors are extremely economical.

MASTER BUILDERS COMPANY ADVERTISEMENT

Eldridge re-opens office

Continued from p. 14

practice. Since World War II he has been in charge of the Australian government sponsored National Assn. of Testing Authorities.

Verbeck appointed manager

George J. Verbeck, formerly senior research chemist, Research and Development Division, Portland Cement Assn., Chicago, has been appointed manager of the Applied Research Section of the division. He replaces William Lerch, who recently was promoted to the position of administrative assistant. Mr. Verbeck's work will be directed toward the theoretical as well as the engineering aspects of technical problems relating to cement and concrete.

Mr. Verbeck is a graduate of Lawrence College, where he majored in chemistry. He received his MS in physical chemistry from the University of Chicago in 1940. Prior to joining PCA, he served for a brief time with Abbott Laboratories. He joined the association in 1941 as assistant chemist on the Long-Time Study of Cement Performance in Concrete.

During the war Mr. Verbeck was employed by the Institute of Gas Technology and Koppers Company, Inc., Butadiene Division. He returned to PCA in 1945 as associate research chemist and later was appointed research chemist and senior research chemist.

Sumwalt elected to ASEE post

Robert L. Sumwalt, dean of the School of Engineering, University of South Carolina, was elected chairman of the Southeastern Section of the American Society for Engineering Education at its 17th annual meeting at Biloxi, Miss.

Gunlock and Sommerschield named as officers

Virgil E. Gunlock, commissioner of subways and superhighways, Chicago, took office as president of the Illinois Society of Professional Engineers during the recent annual meeting. H. F. Sommerschield, structural engineer, Chicago, was elected to the board of directors.

Coleman accepts new position

Percy L. Coleman, chief structural engineer in the general engineering department of Monsanto Chemical Co. since 1943, has accepted a similar post with C. J. Smith and Co., consulting engineers, St. Louis. Formerly Mr. Coleman was associated with Albert Kahn, Inc., associated architects and engineers of Detroit.

Cummings visits Colombia

A. E. Cummings, director of research, Raymond Concrete Pile Co., New York, recently returned from a trip to Columbia where he visited the Neusa Dam site and Cali-Buenaventura highway project.

Reidy elected president

Peter J. Reidy has been elected president of the Structural Engineers Society of New York. He is president of Purdy and Henderson Associates, Inc., consulting engineers, New York.

New vermiculite uses discussed

An important role for vermiculite in defense construction was forecast by Eric W. Hammarstrom, chief, Non-Metallic Building Materials Branch, National Production Administration, at the annual meeting of the Vermiculite Institute at Fort Lauderdale, Fla.

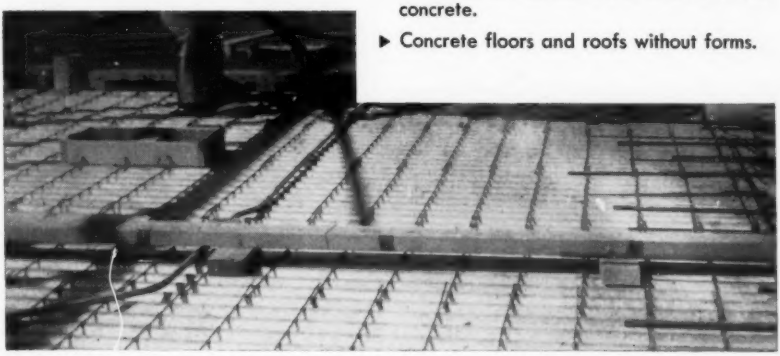
"Vermiculite as an insulation and as an aggregate replacing sand in lightweight concrete and plaster will greatly relieve the shortage of critical construction materials," he said.

A structural vermiculite-sand concrete weighing half as much as ordinary concrete was described by C. A. Pratt, Western Mineral Products Co., Minneapolis. The concrete will save critical steel, he said, and is designed for floor construction where bar joists or Junior I-beams carry the slab. Recent tests of full-scale models showed that a 3-in. floor slab over 24-in. center joists spacing will carry from 15 to 23 times more live load than the 80 psf required for many light occupancy buildings.

An exterior stucco that reduces cracking and is easier to apply than straight sand stucco mix was described by Glenn Sucetly, California Zonolite Co., Los Angeles. The new stucco is a mixture of vermiculite, sand and cement.

COFAR

- Reinforced concrete without forms.
- High-strength, deep-corrugated steel manufactured with welded, closely spaced transverse wires (T-wires).
- Positive reinforcement permanently anchored to and combined with structural concrete.
- Concrete floors and roofs without forms.



STRONG

Guaranteed yield point (.1% offset) over 80,000 psi effective as reinforcement, balanced design, up to full tensile strength over 100,000 psi, independent of form stress.

VERSATILE

Minimum 24 ga. —(A_s .35 sq. in. per foot width); maximum 18 ga. —(A_s .73 sq. in. per foot width); to meet full range concrete slab design. COFAR reinforcement satisfies all normal concrete slab design.

Cold-drawn, high-strength T-wires not over 6″ c.c. are welded to the deep-corrugated steel, in manufacture, and constitute temperature reinforcement in the slab, mechanical anchorage and positive shear transfer from concrete to steel.

PERMANENT

COFAR sheets hot-dip galvanized, with specification heavy galvanizing, provide complete permanence for normal interior exposures. Concrete and steel permanently bonded by chemical union of calcium zincate for all normal loads. Fire resistance for any exposure by lightweight, modern ceiling plaster or fibre protection.

ECONOMICAL

COFAR ***is concrete reinforcement,*** steel weight substantially equal to conventional reinforcement; COFAR ***also is the concrete form.*** Form sheeting as well as concrete runways are eliminated. COFAR comes detailed and cut to fit each job. Important material, labor, and time savings are made.

Advice for design engineers, review and estimates. COFAR is available — Granco Steel Products Company.

GRANCO STEEL PRODUCTS CO.
(*Subsidiary of* GRANITE CITY STEEL CO.)
GRANITE CITY, ILLINOIS

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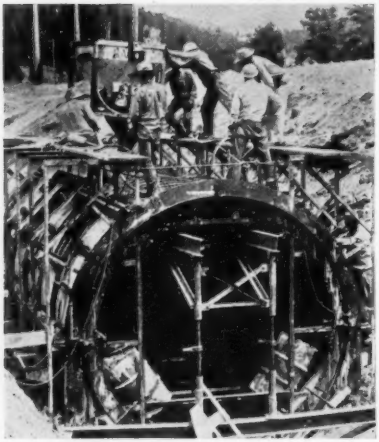


CONCRETE SIPHONS—Special forms were built by K-C Construction Supply Co., Denver, for the cast-in-place concrete siphons on the 3600-ft Olympus siphon of the Colorado Big Thompson project. The siphon, near Estes Park, Colo., has an inside diameter of 10 ft 9 in. and links Olympus Dam and Olympus Tunnel. Water stops were $\frac{3}{16}$ x 8 in. wrought iron plate. The contractor for the Bureau of Reclamation project is Peter Kiewit Sons Co., Omaha.

300 discuss practical problems

A Conference on Practical Concrete Problems, held last month in San Francisco had about 300 in attendance. It was presented by Division of Engineering Extension and Department of Conferences and Special Activities, University of California, in cooperation with local members of ACI, the Central California chapter of AGC and the Portland Cement Information Bureau.

The conference featured a discussion of concrete problems led by a panel which included W. A. Grant, technologist, Ready-mix Concrete Co., Ltd.; E. L. Howard, Jr., testing engineer, Pacific Coast Aggregates, Inc.; J. E. Jellick, manager, Portland Cement Information Bureau; J. W. Kelly, professor of civil engineering, University of California; and W. C. Tait, contractor.

The panel discussed questions on crack prevention, formwork, dusting, admixtures, air-entraining agents, patching and repair, standard field tests, lean mixes, waterproofing and other on-the-job problems.

Roy W. Crum

Continued from p. 4

Mr. Crum was chosen director of the Highway Research Board in 1928. Under his leadership, research made with the Board's cooperation has expanded greatly and its usefulness extended to every field of highway activity. The first annual HRB meeting in 1922 featured two committee reports; almost all of the 70 committees now working on highway problems reported at the 30th annual meeting this year.

An ACI member since 1924, Mr. Crum served on advisory, publications, program and technical committees. As director, vice-president, president and past president, he served 9 years on ACI's Board of Direction.

Lawrence A. Cline

Lawrence A. Cline, vice-president of United Concrete Pipe Corp., Baldwin Park, Calif., died recently in Los Angeles. During World War II he was officer-in-charge of a naval construction battalion in the Aleutian Islands and later of a naval construction regiment in the Okinawa campaign.

Fred A. Luber

Fred A. Luber, chief of the architectural engineering department, Wisconsin Electric Power Co., Milwaukee, died recently. He joined the firm in 1910 as a draftsman and prior to his death was in charge of design and construction of company buildings, including the recently completed Port Washington power plant. Mr. Luber was president of the Milwaukee Harbors and Rivers Assn., chairman of the Milwaukee Building Code committee, and chairman of the Wisconsin State Building Code committee.

Donald D. Reynolds

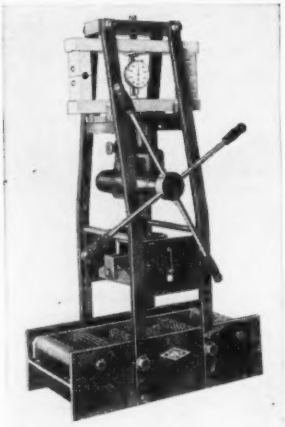
Donald D. Reynolds, vice-president, Boston Sand and Gravel Co., Cambridge, Mass., and a member of the board of directors and the executive committee of the National Sand and Gravel Assn., died recently.

Walter H. Flood

Walter H. Flood, consulting paving technologist, died recently. He had his own firm for more than 35 years and had done much highway work for state and city organizations.

Tools, Materials, Services

Under this heading note will be made from time to time of producer literature of presumed technical interest (and available from its source for the asking) to ACI users of tools, equipment, materials, accessories and special services.



Concrete beam tester

A new machine determines, by direct reading, the flexural strength of 6 x 6 in. concrete beam specimens. The machine has a maximum flexural strength capacity of 1250 psi (15,000-lb load). One division on the gage dial indicates an applied load of 120 lb which corresponds to a flexural strength of 10 psi.

When the width or depth of the specimen varies from the nominal (6 x 6 in.) by more than 0.05 in., a correction factor must be applied.

The testing machine is separable into three parts weighing 90, 70 and 35 lb each. Molds for 6 x 6 x 21 in. and 6 x 6 x 36 in. specimens (for 18 in. span third-point loading tests) can be collapsed for convenient transportation.—American Instrument Co., Inc., Silver Spring, Md.

Blade costs in masonry cutting

Instructions on how to figure blade costs in masonry cutting before starting full cutting operations are contained in a booklet (No. 101) released by Eveready BrikSaw Co.

"How to Cut Blade Costs in Masonry Cutting" tells how an operator can run simple blade cost analysis tests; lists the correct abrasive or diamond blade to use on different materials; tells when to use an abrasive blade, and when to use a diamond blade; tells how to make special or duplicate cuts on a masonry saw; and other helpful facts.—Eveready BrikSaw Co., 1509 South Michigan Blvd., Chicago 5, Ill.

Portable gasoline hammer

Introduction of improved models of Barco portable gasoline hammers featuring a new ignition has been announced. Two hammers use a new, compact ignition coil-vibrator-condenser assembly located in the right hammer handle. The hammer is air cooled and gets its power from a single, two-cycle, full-floating piston.—Barco Manufacturing Co., Dept. J-31, 1801 W. Winnemac Ave., Chicago 40, Ill.

Snow melting systems

Various installations of snow melting systems are described and illustrated in a 36-page booklet issued by A. M. Beyers Co. The design portion has sections on coil and grid patterns, temperature drop, and effect of anti-freeze solutions. The booklet also includes sections on auxiliary units, controls, paving design and fill, fabrication and installation, costs, operational practices and frost prevention systems.—A. M. Byers Co., 1501 Clark Bldg., Pittsburgh, Pa.

American standards listed

Ninety-nine new and revised American standards are listed in the latest edition of the 26-page "Price List of American Standards" published by the American Standards Assn.—American Standards Assn., 70 East 45th Street, New York 17, N. Y.

Air compressor

Bulletin H-850-B73 issued by Worthington Pump and Machinery Corp. describes the Blue Brute 160-ft portable air compressor. The compressor is illustrated and specifications listed.—Advertising Extension, Worthington Pump and Machinery Corp., Dunellen, N. J.

"X-Y" type recorder

A new self-contained and portable strip-chart recorder of the "X-Y" type for plotting automatically on rectangular coordinates the simultaneous relationship between any two variables that can be made to actuate Microformers has been developed by Baldwin-Lima-Hamilton Corp.

The recorder, the MD-2, may be used with any testing machine in which hydrostatic pressure in either the loading or weighing system is proportional to load applied to the specimen. The MD-2 recorder can also be used with some types of testing machines having mechanical loading and weighing systems.

Microformers are miniature variable transformers having usable core movements of 0.120 in. Displacement of the core of an external, sensing Microformer upsets the balance of a self-balancing bridge of which it and the recorder Microformer are a part. The unbalanced signal is amplified by an electronic circuit and drives a servo-motor. This moves the core of the recorder Microformer to the same position as the external core, thus re-establishing electrical balance, and operating the recorder drum or stylus.—Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

50,000 readings per second

An electronic device to read test instruments at speeds up to 50,000 readings per second and record the readings on tape or punched cards ready for computation has been developed by Arthur D. Little, Inc.

The "Digital Reader" is expected to eliminate cumbersome human work involved in recording and computing from strain, pressure, acceleration and temperature gages. At present it is often necessary to photograph instrument dials at stated intervals; research workers must then jot down the readings and arrange them for computation. Some recording instruments trace out a chart which must be similarly examined and translated.

The Digital Reader, when linked to the instruments to be recorded, rapidly converts the electrical signals from the instruments to binary-digital form. It is a unit about 20 x 30 x 5 in., operating from 110-125 volts, and can be incorporated in a variety of multiple-instrument reading and recording systems.—Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass.

High-conductivity concrete for panel heating systems

A new concrete additive developed by Products Planning Co. to increase the heat conductivity of concrete, especially when used in connection with radiant heating in the floor, consists of a blend of aggregates and different forms of alumina.

The manufacturer says that tests show a 33 percent increase in heat conductivity over normal concrete and strengths of 4200 psi. It was said that best results were obtained when the additive was used with commercial grades of concrete mixes using Type I cement and dense aggregates.—Products Planning Co., 424 Bakewell Building, Pittsburgh 19, Pa.

Portable weigh-batcher

A new portable weigh-batcher has been introduced by Mixermobile Manufacturers. The unit weigh-batches aggregate on the job and can be charged directly from dump trucks. Three 7-cu yd bins and a 2-cu yd skip store up to 23 cu yd of aggregate. It can be equipped with either dial or beam scales to weigh aggregate.

The Mixermobile weigh-batcher travels at normal highway speeds, is 12 ft high, 8 ft wide and has an over-all length of 28 ft with the charging skip down.—Mixermobile Manufacturers, 8027 N. E. Killingsworth, Portland 20, Ore.

Strain gages

A new bulletin, No. 174, issued by Baldwin-Lima-Hamilton Corp., describes and gives specifications for ten new type SR-4 resistance wire strain gages.—Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

Applying cement over steel gridwork

An illustrated bulletin showing the step-by-step procedure in applying corrosion-resistant cement over steel gridwork has been issued by the Pennsylvania Salt Manufacturing Co. Cement on steel grating linings offers high resistance to erosion, and successful installations have been made in refineries for lining points of attack in fluid catalytic cracking equipment in the feed and return lines, fittings, valves and cyclone equipment.—Pennsalt Chemicals, Special Chemicals Dept., 1000 Widener Building, Philadelphia 7, Pa.

Curtain wall uses lightweight aggregate

A newly developed 6-in. perlite curtain wall recently received a 4-hour fire rating from Underwriters' Laboratories, Inc.

The wall, less than half as thick and weighing about ¼ as much as a conventional wall, consists of an exterior 4-in. layer of Permalite-portland cement plaster or concrete and an interior 1-in. layer of Permalite-gypsum plaster, separated by a furring channel.

Paper-backed steel lath or aluminum lath is fixed to and spaced 1 in. from the exterior edge of vertical structural steel supports. The steel supports are designed to allow for expansion and contraction when bolted together; they can be provided with metal fins which extend through the concrete, to attach various types of facade which might be applied when this construction is used in exterior panel walls. These fins would be omitted for interior walls.—Great Lakes Carbon Corp., Building Products Division, 18 East 48th Street, New York 17, N. Y.

Who's Who

Continued from p. 10

R. F. Blanks of "False Set in Portland Cement" in the March JOURNAL.

He has been with the Bureau since 1933 and has been active in investigations on the alkali-aggregate problem as well as false set.

H. H. Roberts

H. H. Roberts, consulting engineer, L. E. Dixon Co., general contractors, San Gabriel, Calif., and formerly chief engineer with Consolidated Builders Inc., Detroit Dam, Ore., describes methods used for "Cooling Materials for Mass Concrete," p. 821.

Mr. Roberts has worked on numerous dam projects; from 1929-32 he was employed by Stone and Webster Engineering Corp. on Rock Island Dam, Wash. He was with the Washington State Department of Highways for two years, then joined the Majon, Walsh, Atkinson, Kier Co. as assistant engineer on the Grand Coulee Dam project, 1934-38. Mr. Roberts was also assistant engineer with Guy F. Atkinson Co. at Mud Mountain Dam, Wash.

From 1941-45 he was chief engineer for the contractors on Pacific naval air bases, Port Hueneme, Calif., and from 1945-47 he was a partner in the engineering firm of Moffat, Nichol and Roberts, Los Angeles. From 1947-49 he was again chief engineer with Ozark Dam Constructors, Bull Shoals Dam, Ark., and chief engineer on the Detroit Dam project, 1949-51.

Rudolph C. Valore, Jr., and William C. Green

"Air Replaces Sand in 'No-Fines' Concrete," p. 833, is by Rudolph C. Valore, Jr., and William C. Green, materials engineer and structural research engineer, respectively, National Bureau of Standards, Washington, D. C.

Mr. Valore has been employed by the Bureau since 1938. He was a member of the Concreting Materials Section, 1939-48, and is now in the Structural Engineering Section of the Building Technology Division. He has been engaged in research on dynamic testing and durability of concrete and other materials, as well as investigations on lightweight concretes.

Mr. Green was associated with Stone and Webster Engineering Corp. and an instructor in the Civil Engineering Department, Rensselaer Polytechnic Institute before joining the Bureau of Standards in 1949. He has been engaged in research on structural and physical properties of lightweight and sand-gravel plain and reinforced concretes.

Many factors considered in ready-mix plant construction

A new 1000 yd per day central-mixed concrete plant in Dallas illustrates the many factors that must be taken into account in the installation of a ready-mixed concrete plant.

Heading the equipment list for the Wamix, Inc., plant are the two 2-cu yd tilting mixers, which empty into a 6-cu yd collecting hopper. From the hopper, an air-controlled clamshell gate allows mixes to be gravity fed to the open dump type trucks.

One of the features of the plant is the automatic batching system. The water, cement, sand and gravel are each weighed automatically in individual hoppers on separate scales instead of using an accumulative scale. The weighed material is discharged into a collection hopper which discharges to either of the two mixers.

In addition, an automatic dispenser provides the desired quantities of air-entraining agent for each batch. The dispenser has a solenoid valve activated by a time switch. The valve is gravity fed from a reservoir tank. A mercuroid float switch which automatically turns off and on a pump at ground level keeps a constant head in the tank. The pump is hooked to a 55-gal. drum containing the air-entraining agent.

The heart of a central-mix plant is the two tilting mixers and the batching system above them. Aggregate and cement bins top the structure, with aggregate delivered by conveyor on right, cement by bucket elevator on the left. Cement reclaiming bin is shown at far left.

The plant also includes a 7000-bag (bulk) cement bin, a 490-ton material bin and a 300-ft belt conveyor for gravel and sand transfer. The plant is set up to receive

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cement in bulk from hopper bottom cars or in bags from box cars. The cement goes from the cars to an undertrack screw conveyor and then to the overhead cement bin via bucket elevator. The reclaiming bin can be filled with the overflow from the top bin.

Aggregate is trucked in and discharged into a 15 cu yd grade level hopper and through a clamshell gate onto the 36-in. conveyor belt. The belt discharges into a turnhead which can discharge into one of the three aggregate bin compartments. The fourth compartment is enclosed for cement.

Equipment, handling procedure, transportation facilities, storage and economics are only a few of the factors that must be figured in the engineering of a central-mix plant.

Errata

The following corrections should be made in ACI Standard "Specifications for Concrete Pavements and Bases (ACI 617-51)," ACI JOURNAL, May 1951, pp. 721-744. (Some JOURNALS will carry the correct notations. These were corrected part way through the press run.—EDITOR)

p. 730—**Section 31. Soil base material** should read:

> Soil base material shall meet the requirements as specified in the current AASHO Specification for Materials for Stabilized Base Course, *M 147*.

p. 738—**Section 57. General**, paragraph (*b*) 2nd sentence should read:

> It shall be thoroughly consolidated against and along the faces of the *forms*.

European libraries need Journals

During a recent two-month trip through Europe, Anton Tedesko, manager, structural department, Roberts and Schaefer Co., Chicago, Ill., visited European engineers and scientists interested in concrete and concrete research. All mentioned the lack of funds, especially the lack of currency which makes it impossible for them to replace books and ACI JOURNALS of past years lost during the war. Desiring to be helpful in restoring some of the important educational libraries, Mr. Tedesko has offered his help in getting back numbers of the JOURNAL to deserving libraries and engineers.

Will members who no longer have use for back numbers please *write directly* to Mr. Tedesko at the address given below listing by month, year and volume number the JOURNALS they would be willing to contribute. **Please do not send the JOURNALS.** Mr. Tedesko will reply asking for the numbers he wishes and will give instructions regarding their shipment overseas.

ANTON TEDESKO
130 North Wells Street
Chicago 6, Ill.

Membership certificates

Repeated but infrequent requests for membership certificates indicate that enough members may want them to warrant having them made. At its fall meeting, the Board of Direction authorized the Secretary to determine through this notice whether or not the Institute would be justified in going to the expense of having the necessary work done.

It is estimated that certificates suitable for framing can be furnished ACI Members at a cost of not over $3.50. Those interested are requested to clip the attached coupon and mail it to Institute headquarters. *Please do not send money until billed.* If there are not enough interested, the Institute would not be justified in supplying certificates to a few at a loss.

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Gentlemen: Please place an order for one membership certificate to be furnished provided enough members buy them to make it worthwhile at a cost not to exceed $3.50.

Signed.....

SYNOPSES of recent ACI Papers and Reports

Institute papers of this JOURNAL Volume 22 are currently available at prices indicated. Please order by title and title number.

SOME OBSERVATIONS ON THE USE OF REINFORCING STEEL IN CONCRETE PAVEMENTS.....47-1

Price 35 cents.

BENGT F. FRIBERG—Sept. 1950, pp. 1-16 (V. 47)

The paper contains a few accumulated observations from a review of literature on the evolution of reinforced concrete pavement designs, with reference to various systems of reinforcement which have seen extended use. Typical structural concrete pavement failures are described. Trends in design and reinforcement practice are shown, with special reference to recent developments. Pertinent findings of a few published pavement surveys are cited, with special attention to the 900-mile Louisiana pavement survey made in 1945. The need for performance information and additional research is stressed.

TESTS OF PAPER MOLDS FOR CONCRETE CYLINDERS.....47-2

Price 35 cents.

ROBERT A. BURMEISTER—Sept. 1950, pp. 17-24 (V. 47)

Concrete test cylinders cast in a new type paper mold had a compressive strength lower than that predicted for the concrete mix used. Investigation showed that cracks and mechanical injuries to the outer shell of the concrete cylinder caused by movement of the paper stock during the first 24 hours of curing reduced the strength of the cylinder. To a lesser degree this was true also of the paraffined paper molds in common use for casting test cylinders, specimens cast in both types of paper molds showing lower strengths than test cylinders from the same mix cast in steel molds.

ADMIXTURES IN CONCRETE.....47-3

Price 60 cents.

W. T. MORAN, F. H. JACKSON, BRUCE E. FOSTER and T. C. POWERS—Sept. 1950, pp. 25-52 (V. 47)

Five papers by members of ACI Committee 212, Admixtures, are, because of their common general subject, presented together.

Various admixtures are discussed briefly as an introduction to more detailed treatment of air-entraining materials. The relative merits of admixtures and intergreund agents are considered. Optimum ranges of air content for different structural uses are given with particular reference to pavements.

The advantages and disadvantages of several types of admixtures used in the fabrication of various concrete products, such as building block, cast stone, pipe, cribbing and curbing, are discussed. The admixtures considered are classified into the following groups: accelerators, air-entraining agents, gas-forming agents, water repellent agents, and workability agents.

The factors affecting bleeding characteristics and workability of fresh concrete are reviewed and the effect of admixtures on these properties is assessed.

Present knowledge of admixtures in counteracting alkali-aggregate reactions is reviewed. It is emphasized that further studies may revise thinking in this field.

The effectiveness of various concrete admixtures in inhibiting the capillary flow of water and the flow of water under pressure is considered. The types of admixtures included in the discussion are accelerators, soaps, butyl stearate, finely subdivided dry materials, mineral oil, workability agents, and a miscellaneous group of proprietary compounds.

IMPROVED SONIC APPARATUS FOR DETERMINING THE DYNAMIC MODULUS OF CONCRETE SPECIMENS.....47-4

Price 35 cents.

C. E. GOODELL—Sept. 1950, pp. 53-60 (V. 47)

After a brief introduction to sonic testing and a description of commercial equipment, the apparatus built for the Michigan State Highway Department is discussed. Reliable results can be obtained by an unskilled worker with this compact equipment which has twice the frequency band spread of the usual oscillator. A wiring diagram of the sonic apparatus is included.

ANALYSIS OF THREE-DIMENSIONAL BEAM-AND-GIRDER FRAMING.47-5

Price 35 cents.

PHIL M. FERGUSON—Sept. 1950, pp. 61-72 (V. 47)

The beam-and-girder floor with some beams carried directly by columns and others supported on girders is cited as a practical problem in frame analysis that must include the torsional stiffness of the girder. Curves showing how moment coefficients vary with this torsional stiffness are developed for a few simple cases in interior panels. These show the weakness of rule-of-thumb methods.

A practical calculation form is set up for use with the moment distribution method in solving three-dimensional problems of this type.

Proposed Revision of SPECIFICATIONS FOR CONCRETE PAVEMENTS AND BASES (617-44).....47-6

Price 35 cents.

REPORT OF COMMITTEE 617—Oct. 1950, pp. 93-116 (V. 47)

New specifications incorporated include those covering air entrainment, removal of forms, premolded joint fillers and joint filling materials and method of placing reinforcement. Definitions have been added under soil foundation preparation and other parts of this section have been revised.

LINEAR TRAVERSE TECHNIQUE FOR MEASUREMENT OF AIR IN HARDENED CONCRETE.....47-7

Price 35 cents.

L. S. BROWN and C. U. PIERSON—Oct. 1950, pp. 117-124 (V. 47)

The method described for the determination of air in hardened concrete permits the examination of 6 x 8-in. and 6 x 10-in. random plane face-ground hardened concrete specimens which more truly represent the aggregate and air voids in the actual concrete than smaller specimens. The construction and use of the instruments are discussed and results of tests are given. Because of the time and equipment necessary to measure air content by means of the integrator, it is not adaptable to field use. However, as a laboratory tool it provides a means for quick and accurate determination of total air.

INFLUENCE OF THE QUALITY OF MORTAR AND CONCRETE UPON CORROSION OF REINFORCEMENT.47-8

Price 35 cents.

RACHEL FRIEDLAND—Oct. 1950, pp. 125-140 (V. 47)

In tests to determine the influence of the quality of mortar and concrete upon corrosion of reinforcement the variables studied were cement content, water-cement ratio, consistency, grading and depth of cover. The specimens, stored in moist air or exposed to weather, were tested up to the age of 2 years.

The results indicate that consistency has a pronounced effect upon the protective value of mortar and concrete, and that there appears to exist an "optimum consistency" at which the quantity of rust is practically unaffected by time. It was also found that the usual cement contents in reinforced concrete have only a limited effect upon corrosion. It is concluded that water-cement ratio does not in itself control the rate of corrosion of reinforcement.

PROPER SAND GRADING IMPROVES MASS CONCRETE.....47-9

Price 35 cents.

THOMAS B. KENNEDY—Oct. 1950, pp. 141-152 (V. 47)

Two series of concrete mixtures were designed using 6-in. traprock coarse aggregate and eight separate gradings of natural sand ranging in fineness modulus from 3.60 to 1.35. Tests were made of the plastic concrete, and specimens were cast for tests of compressive strength, resistance to freezing and thawing, and drying shrinkage. Both series of concrete mixtures had a cement content of 2.5 bags per cu yd; one had a normal air content—4½ ± 1½ percent in the portion of the mixture passing the 1½-in. sieve—and the other had a high air content—10 ± 2 percent in the portion of the mixture passing the 1½-in. sieve. Tests indicate that good durability in freezing and thawing can be obtained within the normal air content range with fineness modulus between 2.50 and 2.90. With increased air content, however, the fineness modulus range can be increased to extend from 1.58 to 3.24. Compressive strength was generally affected adversely by increased air content, but not to a serious degree. Drying shrinkage was less with normal air content mixes than with high air content mixtures. It was least when a fineness modulus of 2.52 was used, little difference being apparent between the high and normal air content mixes with this fineness modulus. The air-entraining admixture requirement increased greatly as the fineness modulus of the sand decreased. The water ratio also tended to increase with decreasing fineness modulus.

WATER-SOLUBILITY OF ALKALIES IN PORTLAND CEMENT.....47-10

Price 35 cents.

J. L. GILLILAND and T. R. BARTLEY—Oct. 1950, pp. 153-160 (V. 47)

In an effort to show correlation of soluble alkalies with alkali-aggregate reaction, the authors hydrated a number of cements for periods up to 90 days and analyzed water extracts of the ground hydrated cement. However, the correlation with expansions of mortar bars prepared with reactive aggregate was not improved by considering water-soluble alkalies rather than total alkalies.

The rate at which the alkalies become water-soluble in hydrating cement indicates that the alkali-bearing phases in cement hydrate quite readily.

NEW PRESTRESSING METHOD UTILIZES VACUUM PROCESS.....47-11

Price 35 cents.

K. P. BILLNER—Oct. 1950, pp. 161-176 (V. 47)

The method outlined here was developed to simplify prestressing of concrete to make it generally adaptable to American ways of construction. It eliminates costly anchorages; uses large diameter wires (⅜-in. diameter now available on the market), instead of the customary ¼-in. diameter wire, thus greatly reducing the number of wires required; prestresses all the wires in the building element simultaneously and simplifies forming. A simplified method of design calculations for prestressed concrete and the result of tests of a beam so designed are included.

PROPOSED RECOMMENDED PRACTICE FOR THE APPLICATION OF MORTAR BY PNEUMATIC PRESSURE 47-12

Price 35 cents.

REPORT OF COMMITTEE 805—Nov. 1950, pp. 185-196 (V. 47)

This proposed ACI Standard presents briefly the advantages and disadvantages of pneumatically-placed mortar and establishes recommended practices for placing and mixing shotcrete, qualifications and duties of workmen, preparation of surface before shotcreting, reinforcing, sequence of application, and other items involved in good shotcreting.

DETERMINING OPTIMUM CROSS SECTIONS FOR PRESTRESSED CONCRETE GIRDERS.....47-13

Price 35 cents.

FRED J. UZIEL—Nov. 1950, pp. 197-212 (V. 47)

General solutions are presented for selecting economically optimum cross sections for prestressed concrete flexural members. Such a solution for simply-supported girders of rectangular cross section, for any span and load, assuming the wires prestressed after setting of the concrete and full dead weight to act during the prestressing operation, leads to a design procedure which, in the case considered, is extremely simple and rapid to apply. It also permits comparisons and studies related to the critical cross section to be made in a more general and conclusive manner. For cross sections other than rectangular, the number of variables making the solution more indeterminate in nature, a similar direct solution is not obtainable. However, a rapid way of obtaining the minimum areas of concrete and steel required is suggested.

STEAM CURING PROTECTS WINTER CONCRETING.....47-14

Price 35 cents.

C. O. CRANE—Nov. 1950, pp. 213-216 (V. 47)

The use of live steam for protecting newly placed concrete from freezing weather and for providing initial curing has resulted in excellent concrete in the Enders Dam spillway at no greater cost than less desirable dry heating methods. This brief paper describes in detail the methods used.

ANALYSIS OF CONTINUOUS CIRCULAR CURVED BEAMS.....47-15

Price 35 cents.

BECLA VELUTINI—Nov. 1950, pp. 217-228 (V. 47)

Continuous circular curved beams can be analyzed easily by the moment distribution method if both bending and torsional end couples are considered. Formulas and tables are presented for circular curved beams of constant cross section that give the relations between the end moments and end torques and the corresponding rotations of the end sections. A proposed method of procedure is illustrated in which the bending end couples are kept separate from the torsional couples. The mathematical operations are not difficult as the convergence is rapid, but attention must be paid to the sign convention which must be definite and easy to apply.

SHEAR RESISTANCE OF TILE-CONCRETE FLOOR JOISTS.....47-16

Price 35 cents.

J. NEILS THOMPSON and PHIL M. FERGUSON—Nov. 1950, pp. 229-236 (V. 47)

Tests on certain types of tile-concrete joists indicate that the tile webs are more effective in resisting diagonal tension than is indicated by the current ACI Building Code specification. Stagger of tile joints appears to be unnecessary, since they do not seem to be planes of weakness insofar as diagonal tension is concerned. The tile reduces the deflection of the joist.

SOLUTION OF DIFFICULT STRUCTURAL PROBLEMS BY FINITE DIFFERENCES.....47-17

Price 35 cents.

ALFRED PARME—Nov. 1950, pp. 237-256 (V. 47)

Finite differences can be applied to the solution of those structural problems in which the physical relationships are expressed as a differential equation. Essentially, the technique employed consists of replacing the derivatives of the differential equation by its central difference equivalent. The problem is thus reduced to the simple task of solving a system of simultaneous linear algebraic equations. The numerical computation involved in the procedure is considerably reduced by two devices. First, the number of equations necessary to attain sufficient accuracy is reduced by an evaluation of the error introduced in substituting central differences for derivatives. Secondly, the solution of simultaneous equations is speeded by a systematic rapid tabulation of easily determined values. The procedure is applied to the design of a sheet pile wall, elliptical dome and skewed bridge to illustrate the scope and simplicity of the method.

Proposed Revision of BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-47).....47-18

Price 35 cents.

REPORT OF COMMITTEE 318—Dec. 1950, pp. 269-276 (V. 47)

Proposed changes decrease the allowable bond stress in plain bars (including the old types of deformed bars) and increase the allowable bond stresses for the new types of bars over those previously allowed for the old types. Top bars, those having more than 12 in. of concrete under them, are assigned lower bond stresses than bars in other positions. All plain bars must be hooked, which corresponds to special anchorage under the old provisions. The new bars develop sufficient anchorage by bond alone to correspond to special achorage with the old type bars. Consequently, all bars under the new provisions correspond to those with special anchorage under the old provisions.

CURING CONCRETE PAVEMENTS WITH MEMBRANES.....47-19

Price 35 cents.

C. C. RHODES—Dec. 1950, pp. 277-296 (V. 47)

To provide data to assess the advisability of continuing membrane curing of concrete pavements as an alternate method, laboratory and field tests were made to compare the effect of storage conditions on the physical properties of concrete, warping, temperature control, and strength and abrasion resistance of concrete cured with membranes and with wet burlap. A survey of pavements cured with clear membranes in spring and summer showed that cracking, when it occurred at all, was found predominantly in pavements laid in the morning hours. Comparing white-pigmented membranes with the usual wet-curing conditions in the field it was found to be efficient, practicable and about half as expensiv s wet curing under the same conditions.

BLADE CHANGES IMPROVE TILTING MIXER.....47-20

Price 35 cents.

GLENWAY MAXON—Dec. 1950, pp. 297-300 (V. 47)

Recent experiments, as well as earlier studies, on changing the blading of tilting concrete mixers so as to improve the quality of the mixed concrete are described. The evolution of the blade shapes and the effect of these changes on the path of the materials through the mixer are illustrated.

PROTOTYPE PRESTRESSED BEAM JUSTIFIES WALNUT LANE BRIDGE DESIGN.....47-21

Price 35 cents.

GUSTAVE MAGNEL—Dec. 1950, pp. 301-316 (V. 47)

The tests made on a prestressed concrete beam of 154 ft 8 in. span, identical to the beams of the main span of the Walnut Lane Bridge in Philadelphia, more than justified the adoption of prestressed concrete for the Bridge. The test methods and results are described. The test beam exhibited a safety factor against cracking of about 2, which would be far lower for a reinforced concrete beam. The factor of safety against complete failure was about the same as for reinforced concrete while the deflection was less. It is possible to use prestressed concrete for beams where structural steel can not be used due to excessive deflection. The tests proved that the Walnut Lane Bridge will have an exceptional degree of safety with less weight and greater durability than would be possible with reinforced concrete, as well as being considerably cheaper than the conventional solution.

FINISHING AND CURING: A KEY TO DURABLE CONCRETE SURFACES.....47-22

Price 35 cents.

MYRON A. SWAYZE—Dec. 1950, pp. 317-332 (V. 47)

After a comparison of past and present pavement curing and finishing techniques the significance of timing and character of finishing and the timing and mode of curing are discussed. Laboratory tests are cited to show the effect of time of finishing and curing on surface durability to freezing and thawing. It is recommended that all concrete exposed to frost contain entrained air, have a low water-cement ratio and be thoroughly compacted after placing. A finishing and curing procedure is suggested which is adapted to the ambient conditions and to the hydration needs of the cement.

ECONOMY THROUGH BETTER CONTROL OF REINFORCING STEEL.....47-23

Price 35 cents.

F. TESSITOR and P. ROSEWARNE—Dec. 1950, pp. 333-340 (V. 47)

Difficulties and troubles encountered through the use of reinforcement steels not in strict accordance with present-day specifications are discussed. Data are presented to show the possibility of alleviating the situation for engineers, producers and contractors. Simplification of materials requirements, liberalization of code requirements to permit hot bending of bars and permanent identification of grade of steel would, in large measure, permit designers to apply reinforcement to structures in a more effective manner.

Proposed Revision of MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315-48).....47-24

Price 35 cents.

REPORT OF COMMITTEE 315—Jan. 1951, pp. 349-352 (V. 47)

Changes are proposed in bar designations to conform to the numbered designation of the U. S. Department of Commerce and in all drawings to agree with new bond values and anchorage details for new-style deformed bars. Editorial changes in the text of the Standard are outlined.

COARSE-GROUND CEMENT MAKES MORE DURABLE CONCRETE.....47-25

Price 35 cents.

HAROLD W. BREWER and RICHARD W. BURROWS—Jan. 1951, pp. 353-360 (V. 47)

A test procedure for mortar ring specimens is described. Rings containing coarse-ground cement shrunk less and showed greater resistance to freezing and thawing and to outdoor exposure than those containing fine-ground cement. These laboratory tests indicate that coarse-ground cement produces more durable concrete han fine-ground cement.

SIMPLE EQUIPMENT ECONOMICALLY EXPLORES PRESTRESSING..47-26

Price 35 cents.

MARVIN L. MASS and JACK R. JANNEY—Jan. 1951, pp. 361-364 (V. 47)

A tubular grip utilizing type metal to hold the prestressing wires is described. Other equipment includes a framework against which the prestressing force is applied and adjustable formwork for experimental beams. The equipment is so simple that it can be easily and inexpensively built to permit study of prestressed reinforced concrete in the small laboratory.

LABORATORY TESTS OF SPACED AND TIED REINFORCING BARS....47-27

Price 35 cents.

WILLIAM T. WALKER—Jan. 1951, pp. 365-372 (V. 47)

Tests of beam and pull-out specimens containing spaced and tied reinforcing arrangements indicated that little or no advantage would be obtained by spacing deformed

reinforcing bars at splices. Pull-out tests showed that for deformed bars, placed vertically, in which interlocking of lugs could take place there was a slight increase in strength due to tying the bars. Beam tests showed no significant difference between spacing and tying.
Twelve beams containing three different types of deformed bars either spaced or tied and extending the entire length of the specimens were tested. The sixty vertical pull-outs tested also contained three different types of deformed bars. Half of these were made with the bars spaced and half with the bars tied together. The reinforcing arrangement brought only one bar out of the specimens for pulling; the other was allowed to bear on the base plate.
Spacing of the bars in both beams and pull-outs conformed to the joint code minimum spacing requirement of 2½ diameters center to center with a minimum clear distance of 1½ times the maximum size of coarse aggregate.

FINISHING AIR-ENTRAINING CONCRETE PAVEMENTS.....47-28

Price 35 cents.

CHARLES W. ALLEN—Jan. 1951, pp. 373-376 (V. 47)

Based on a survey of state highway department practices, common difficulties in finishing air-entraining concrete pavements are enumerated. Practices in adjusting transverse finishing machines are given and revised finishing practices are discussed. Delayed finishing, as specified in several states, is considered in connection with the riding qualities of the finished surfaces. On the basis of experience in Ohio it is concluded that smooth pavements can be built of air-entraining concrete without delayed finishing.

EFFECTS OF LATERAL LOADS ON ARCHES.....47-29

Price 35 cents.

JAMES P. MICHALOS—Jan. 1951, pp. 377-388 (V. 47)

The effects of lateral loads on arches and the possible magnitude of these effects are considered. An influence table and influence lines are presented for moments and shears in unbraced parabolic arch ribs of constant cross section. These values are for several ratios of rise to span and several ratios of bending to torsional stiffness. The effect of haunching is studied and its possible importance is assessed. Procedures are presented for drawing approximate and exact curves of moments for unbraced arch ribs and for arch ribs braced with struts normal to the ribs. Numerical studies are included.

GETTING MORE FOR OUR CONCRETE DOLLAR.....47-30

Price 35 cents.

I. E. MORRIS—Jan. 1951, pp. 389-396 (V. 47)

A concrete slab with alternating horizontal elements connected by sloping elements is described and its design is worked out. The system is intended primarily for roofs where an exposed ceiling is desired for economy. It may be used to span considerable distances, either as a simple span or as a series of continuous spans. The members are designed to use both concrete and steel to maximum advantage.

FACTORS INFLUENCING CONCRETE STRENGTH.....47-31

Price 35 cents.

WALTER H. PRICE—Feb. 1951, pp. 417-432 (V. 47)

The effect of mix proportions, type and brand of cement, availability of moisture for curing, accelerators and curing temperatures on the rate and potential strength development of concrete are discussed. The influence of rate and frequency of load applications, dimensions of test specimens and lateral restraint on the indicated strength are also discussed, and information is furnished on the variations in strength which might be expected on a typical job. Compressive, tensile, flexural, bond and shearing strengths are compared, and the strengths of control cylinders are compared with the strengths of cores drilled from structures at later ages. Information is also furnished on strength loss from freezing and thawing and alkali-aggregate expansion.

SONISCOPE TESTS CONCRETE STRUCTURES.....47-32

Price 35 cents.

E. A. WHITEHURST—Feb. 1951, pp. 433-444 (V. 47)

The Soniscope, an instrument which measures group velocities through as much as 50 ft of concrete, was used for the field testing of 13 bridges, one navigation lock, 14 dams and five highway pavements in 12 states. Repeated tests permitted study of changes in the condition of the concrete and the development of group velocities indicating the condition of the structure. The value of the results increases with knowledge of the materials, mix design, method of placement and other characteristics of the structure being tested.

EFFECTIVE SEALING OF CONCRETE PAVEMENT JOINTS.....47-33

Price 35 cents.

H. F. CLEMMER—Feb. 1951, pp. 445-448 (V. 47)

The development of cork, metal and rubber joint sealers is traced and work with thermoplastic and cold-pour joint filling compounds is described. The importance of proper technique of preparing and placing the newer materials is emphasized.

ENTRAINED AIR SIMPLIFIES WINTER CURING.....47-34

Price 35 cents.

JOSEPH J. SHIDELER, HAROLD W. BREWER and WILBUR H. CHAMBERLIN—Feb. 1951, pp. 449-460 (V. 47)

The investigation described was undertaken to determine the winter protection required to protect air-entraining concrete from damage by freezing. Cylinders made with Types II and V cement and various percentages of calcium chloride were cured at temperatures ranging from 10 to 70 F and tested for strength at ages ranging from 3 to 180 days. The resistance of these concretes to accelerated freezing and thawing was compared. The results indicate that the amount of winter protection, as presently specified by the Bureau of Reclamation, can be reduced when air-entraining concrete is used.

PRECAST CONCRETE CONSTRUCTION IN CANADA.....47-35

Price 35 cents.

OTTO SAFIR—Feb. 1951, pp. 461-468 (V. 47)

Precast concrete construction techniques as applied to a warehouse, parking garage and retaining wall project are described. Beams and columns for the precast concrete frames of a warehouse were cast flat in multiple forms on the ground slab. Cold weather required special precautions in mixing, placing and curing the concrete. In a parking garage, precast elements were combined with cast-in-place members to form an essentially monolithic structure. A retaining wall 25-ft high is of precast counterforts and 8-in. wall planks. Principal features of the job were the complicated shape of the counterforts and the weight of the completed units.

FACTORS IN PRESTRESSED GIRDER DESIGN.....47-36

Price 35 cents.

M. FORNEROD—Feb. 1951, pp. 469-480 (V. 47)

Following a general description of the Walnut Lane Bridge the stages of loading of the prestressed concrete girders and the sequence of construction operations as they affected the design are discussed. The owner's stress limitations are listed and longitudinal bending in girders, transverse bending in stiffener diaphrams and shear and principal tensile stress in the girder are considered. Safety factors are considered for various loading conditions.

PRECAST CONCRETE OFFERS PROTECTION AGAINST ATOMIC BLAST.....47-37

Price 50 cents.

ARSHAM AMIRIKIAN—Mar. 1951, pp. 497-516 (V. 47)

Precast concrete is an excellent means for providing protection against atomic blast. The technique is suitable for new construction and is adaptable to existing structures by providing them with a protective shell. Readily-assembled framing elements can be prefabricated at regional plants and stored or stockpiled at various points for immediate use in an emergency.

For design purposes, in this paper, shelters are divided into three groups in relation to their proximity to a probable target. Suggested arrangements and main details of assembly of a number of types of precast framing suitable for each group are presented. A general discussion of the protection problem, the needed weapons data and design criteria are also given.

FALSE SET IN PORTLAND CEMENT.....47-38

Price 35 cents.

R. F. BLANKS and J. L. GILLILAND—Mar. 1951, pp. 517-532 (V. 47)

False set of cement causes difficulties in mixing and placing and even though the stiffening is eliminated by job conditions, extra mixing or the addition of corrective admixtures, undesirable effects on the hardened concrete remain. It adversely affects water requirement, strength, bond between aggregate and matrix, brittleness and cracking, resistance to freezing and thawing, and air-entraining characteristics.

Correctives in the manufacture of the cement are proper cooling of mills or the use of stable calcium sulfate.

DIRECT DESIGN OF T-BEAMS.....47-39

Price 35 cents.

HENRY J. COWAN—Mar. 1951, pp. 533-544 (V. 47)

In designing T-beams by usual methods some initial dimensions of the section must be assumed, either the complete dimensions—and the maximum concrete and steel stresses computed to ensure they are less than the allowable stress—or the effective depth only assumed—with tension area computed and the maximum compressive stress in the flange checked to find if compressive reinforcement is required. The author emphasizes that both methods are likely to produce uneconomical sections and take more time.

The direct design procedure proposed enables the dimensions of a T-beam to be calculated for any given set of conditions. Curves are set up for finding the value of j, and the solution of problems by normal methods and "direct design" are compared by solving six examples. An "equivalent flange" method is proposed for the balanced design of T-beams when the area of compression reinforcement is specified, and results show little difference between exact and approximate methods of design.

ALKALI-AGGREGATE EXPANSION CORRECTED WITH PORTLAND-SLAG CEMENT.....47-40

Price 35 cents.

FEDERICO BARONA DE LA O—Mar. 1951, pp. 545-552 (V. 47)

Rather than a pozzolan, granulated basic blast furnace slag described in ASTM Specification C205 should be considered a latent or potential cement with a high siliceous glass content that requires the presence of hydrated lime and gypsum to hydrate properly. To correct alkali-aggregate expansion, a high proportion of slag (about 50 to 60 percent) should be used, which does not reduce strength, rather than lower percentages (20 to 30) which can not be exceeded with pozzolans unless strength is sacrificed. The portland-blast furnace slag cement produced in Mexico, meets ASTM requirements, presents satisfactory strength, low heat of hydration and low alkali content. The corrective action was investigated using Pyrex glass as reactive aggregate, and $NaOH$ to increase the alkali content of the different cements and blends to the same high value (1.23 percent).

Under similar conditions, with the same high alkali content, much smaller expansions were obtained with slag blends than with straight portlands. It is not intended to compare or recommend the use of slag instead of pozzolans, or the use of portland-blast furnace slag cement instead of modified, low-heat, or sulfate resistant portland cement, since in each case, the availability, cost and special conditions will determine what to use. In many cases, slag can be used advantageously to replace 50 to 60 percent of portland clinker.

LEAN MASS CONCRETE USED FOR INTERIOR OF DAMS.....47-41

Price 35 cents.

BYRAM W. STEELE—Mar. 1951, pp. 553-560 (V. 47)

It is not necessary for concrete in the interior and exterior of a dam to have equal durability. By placing 4-bag concrete on exterior faces and lean mass concrete (2½-bag mix) in the interior, it is possible to achieve both durability and economy in gravity dam construction. Lean mass concrete is important in minimizing volume-change cracking; the ensuing economy is an additional feature. The use of interior and exterior mixes in Corps of Engineers dams is described.

ACI'S PLACE IN A BILLION DOLLAR INDUSTRY.....47-42

Price 35 cents.

FRANK H. JACKSON—Apr. 1951, pp. 581-588 (V. 47)

Retiring ACI President Jackson examines Institute activities in relation to the concrete construction industry. ACI has won for itself a high place among the national professional engineering societies, but that eminence cannot be held without continual vigilance and increased effort on the part of all Institute members. Three major phases of activity are examined—annual and regional meetings, publications and committee functions. Recommendations are presented for improving and increasing Institute activities.

BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-51).....47-43

Price 50 cents (in special covers).

REPORT OF COMMITTEE 318—Apr. 1951, pp. 589-652 (V. 47)

Supersedes 44-1 and 47-18.

This code covers the proper design and construction of buildings of reinforced concrete. It is written in such a form that it may be incorporated verbatim or adopted by reference in a general building code, and earlier editions of it have been widely used in this manner.

Among the subjects covered are: Quality of concrete; allowable stresses; mixing, placing, curing and cold weather protection of concrete; forms; cleaning, bending, placing, splicing and protection of reinforcement; construction joints; general design considerations; flexural computations; shear and diagonal tension; bond and anchorage; flat slabs; columns and walls; and footings. The quality and testing of materials used in the construction are covered by references to the appropriate ASTM standard specifications.

THIN CONCRETE TOPPING RESTORES OLD PAVEMENT.....47-44

Price 35 cents.

H. WALTER HUGHES—Apr. 1951, pp. 653-660 (V. 47)

Lack of information on bonding new concrete to old led to laboratory bonding tests on wet and dry surfaces. Favorable results led to experiments on topping concrete road slabs, which required special techniques in bonding, screeding, compacting and finishing. No sign of surface disintegration has been observed after 6 years on any of the sections. Results indicate that the use of low water-cement ratio, graded mixes and compaction gives ample bond for thin toppings of floors or badly scaled pavements in which the concrete is sound. Concrete pavements containing low durability aggregates can also be given durable wearing surfaces with thin high-grade toppings

UNIT BUILDINGS CUT CONSTRUCTION COSTS.....47-45

Price 50 cents.

L. G. FARRANT and W. C. HARRY—May 1951, pp. 669-680 (V. 47)

Design of a parking garage, separating the building into many parts, resulted in a highly functional and flexible low cost structure. The authors recognize that the principle of unit buildings can be applied to any type structure. A flat slab readily adapts itself to this principle and in this design it was again proved that the methods of analysis recommended by ACI can be applied to a slab of unconventional nature to obtain adequate safe design.

PLAIN AND REINFORCED CONCRETE ARCHES.....47-46

Price 50 cents.

REPORT OF COMMITTEE 312—May 1951, pp. 681-692 (V. 47)

A general method for the design of arches taking into account all important factors such as dead and live loading and the effects of volume changes, abutment movements and arch deflections. Because of the nonlinear relation between loads and the bending moments caused by deflections, it is found necessary to use an ultimate strength method of design taking into consideration the total effect of critical loading conditions including possible overload. The method permits the proportioning of a rib for optimum stiffness under assumed conditions, thus providing the most economical and satisfactory design.

While it has been general practice to disregard the effect of arch rib deflections, it should be included in the analysis to provide a proper safety factor against buckling and failure due to bending.

NEW APPROACH TO INHIBITING ALKALI-AGGREGATE EXPANSION.....47-47

Price 50 cents.

W. J. McCOY and A. G CALDWELL—May 1951, pp. 693-708 (V. 47)

Investigators have studied for a decade the chemical reactions between high-alkali cement and siliceous mineral constituents of some aggregates toward deterioration of concrete. Papers on this subject indicate a consensus that there are just two possible remedial measures when reactive aggregates are used—low-alkali cement or substitution of a pozzolanic material for 20 to 30 percent of the portland cement.

Investigative work focused off the beaten path of pozzolans and lowering cement alkali content resulted in experimental data which indicate that small amounts of certain materials added to high-alkali cement have an inhibiting effect on expansion reaction. For example, it has been found that 1 percent or less of specific salts will reduce expansion more than 75 percent in Pyrex glass mortar bar tests. This reduction was substantiated by similar mortar bar tests using a small percentage of opal and quartz sand as aggregate.

Additional information indicates that small amounts of certain proteins (0.2 percent or less) added to the cement appear to have a greater inhibiting effect on the expansive reaction than is obtained by comparable air entrainment effected by the conventional air-entraining agents. Such inhibitors appear to have no appreciable detrimental effect on the properties of the high-alkali cements as determined by ASTM specification tests for cement.

RECOMMENDED PRACTICE FOR THE APPLICATION OF MORTAR BY PNEUMATIC PRESSURE (ACI 805-51).....47-48

Price 50 cents (in special covers).

REPORT OF COMMITTEE 805—May 1951, pp. 709-720 (V. 47)

Supersedes 47-12.

This ACI Standard presents briefly the advantages and disadvantages of pneumatically-placed mortar and establishes recommended practices for placing and mixing shotcrete, qualifications and duties of workmen, preparation of surface before shotcreting, reinforcing, sequence of application, and other items involved in good shotcreting.

SPECIFICATIONS FOR CONCRETE PAVEMENTS AND BASES (ACI 617-51).....47-49

Price 50 cents (in special covers).

REPORT OF COMMITTEE 617—May 1951, pp. 721-744 (V. 47)

Supersedes 41-27 and 47-6.

Standard specifications for the construction of portland cement concrete pavement and base under normal conditions, including preparation of the subgrade.

The subjects covered include: materials; proportions of materials based on design for minimum strength or based on uniform cement factor; measurement and handling of materials; mixing; high-early strength concrete; subgrade preparation; forms; installation of joints and reinforcement; placing and finishing concrete; and curing.

ARE PRESTRESSED BRIDGES CHEAPER?.....47-50

Price 50 cents.

STEWART MITCHELL—June 1951, pp. 761-772 (V. 47)

To study the use of prestressed concrete for highway bridges a pedestrian bridge over Arroyo Seco in Los Angeles was designed and placed under contract. In the United States, principal savings are expected to be for formwork rather than in reduction of steel and concrete. Cast-in-place and precast prestressed bridges applicable to California sites are described.

Lack of technical data, cost information and experience restrict the use of prestressing techniques at present. Further studies and better specifications are needed to promote the use of prestressed concrete.

LONG-TIME STUDY OF CEMENT PERFORMANCE IN CONCRETE, CHAPTER 7—NEW YORK TEST ROAD.....47-51

Price 50 cents.

F. H. JACKSON and I. L. TYLER—June 1951, pp. 773-796 (V. 47)

Test procedure, materials, mix proportions and construction procedures on the New York Test Road, a part of the Long-Time Study of Cement Performance in Concrete, are described. All 27 of the Long-Time Study cements were used in conjunction with a nontest cement for adjusting equipment and mix proportions. Performance of the test sections is assessed with respect to durability of the concrete as a material, the only property directly studied in relation to the cement used.

Seven and one-half years after the test pavement was completed no one cement proved superior to the others tested. However, the effects of air entrainment in improving resistance of the pavement to scaling and weathering overshadowed all other variables. The use of abrasives with ice control chemicals caused scaling on non-air-entraining concrete. A 2- to 3-in. increase in slump of the test concrete had no appreciable effect on the durability of the concrete.

SLAB WARPING AFFECTS PAVEMENT JOINT PERFORMANCE 47-52

Price 50 cents.

F. N. HVEEM—June 1951, pp. 797-808 (V. 47)

An investigation of joint troubles and failure is discussed and a method of determining thermal and moisture expansion in thin concrete specimens described. Evidence of warping and curling of pavement slabs and the sequence of events leading to pumping and subsequent faulting of joints are considered. It was evident that curling was due to combined effects of temperature differential and moisture. Profilograph studies of pavement surfaces are described.

One solution to pavement failures is the elimination of expansion joints and the spacing of contraction joints as far apart as possible. No practical method is available that will prevent moisture from accumulating beneath the pavement.

IDENTIFICATION OF DEHYDRATED GYPSUM IN PORTLAND CEMENT..47-53

Price 50 cents.

J. L. GILLILAND—June 1951, pp. 809-820 (V. 47)

False set in portland cement is usually attributed to dehydrated gypsum. Inasmuch as hemihydrate is much more soluble than gypsum, the concentration of sulfate ion in the liquid phase of cement pastes can be used to identify cements in which dehydrated gypsum is likely to cause trouble. The solubility test correlates with the penetration test used to detect stiffening.

While X-ray diffraction and differential thermal methods can be used to identify various forms of calcium sulfate in high concentrations, they are not applicable to the study of calcium sulfate in portland cement.

COOLING MATERIALS FOR MASS CONCRETE 47-54

Price 50 cents.

H. H. ROBERTS—June 1951, pp. 821-832 (V. 47)

To maintain proper temperatures in the 1,500,000 cu yd of concrete in Detroit Dam, several techniques were considered. After an investigation of the heat balance in the materials, it was decided to construct a plant for cooling the aggregate and cement. A brief history of cooling mass concrete precedes the description of the cooling plant for Detroit Dam.

The coarse aggregate is immersed in 35 F water until the aggregate cools to 38 F. It is then drained and screened to remove excess moisture.

Sand and cement are cooled by continuous hollow-flight screw conveyors through which 35 F water is circulated. Heat transfer is through the conveyor surfaces; there is no direct contact with the cooled water.

AIR REPLACES SAND IN "NO-FINES" CONCRETE.....47-55

Price 50 cents.

RUDOLPH C. VALORE, JR., and WILLIAM C. GREEN —June 1951, pp. 833-848 (V. 47)

Concretes containing high-early strength cement, 20 to 30 percent entrained air in place of fine aggregate, siliceous pea gravel and a proprietary resin or detergent air-entraining agent, were made using ordinary rotating tilt-drum mixers. The maximum air contents in mixes having a compressive strength of 500 psi (28 days) were 25 percent (3.3 bag mix) and 29 percent (5.6 bag mix). The ratio of compressive to transverse and bond strengths was about 3. The saturation coefficient and capillarity were much lower, the resistance to freezing and thawing generally higher, and the thermal conductivity (*k*) 30 to 40 percent lower than for a nonaerated sand-gravel concrete. The drying shrinkage was about the same as for a nonaerated concrete. The compressive strength of all mixes decreased about 100 psi for each percent increase in air content, which was difficult to control.

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